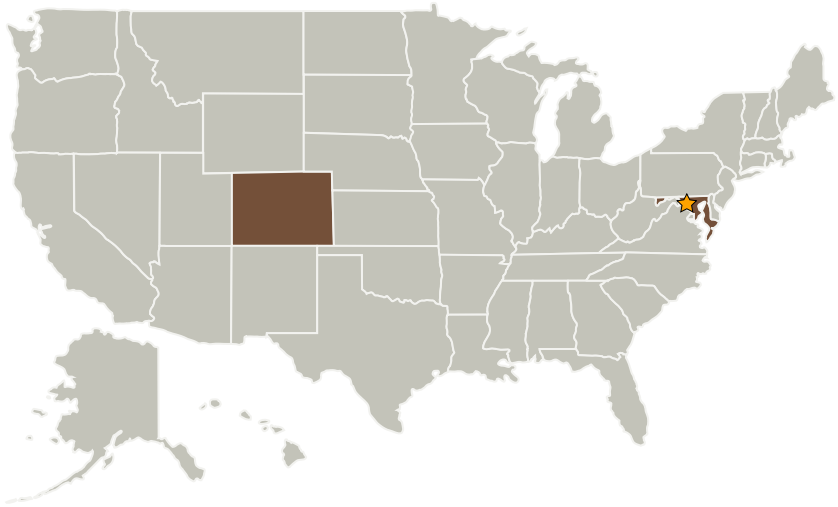
High Impulse Nanoparticulate-Based Gel Propellants, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

This proposed Small Business Innovative Research (SBIR) Phase I addresses the development of advanced gel propellants and determination of their suitability for selected applications. Currently, propellant gels consist of fuel (or oxidizer) combined with a polymeric gellant such as a cellulose derivative and suspended aluminum (or silica) particles. However, higher specific impulse and density specific impulse, more efficient (i.e., finer) spray formation, and reduced pumping requirements are desired so that formulations incorporating combustible particulate species (solid additive and particulate gellant, which, ideally would be the same) are sought. Phase I will consider a matrix of formulations drawn from various highly combustible solid nanoparticulate species and additives. Properties (density and Isp) of various formulations will be calculated. Formulations with the desired calculated Isp will be prepared and measurements of surface tension between various system components performed. Rheological properties of the resulting gels will be measured and the flow and spray characteristics of candidate formulations evaluated. Finally, initial testing of preferred gel systems arising from Phase I will be conducted. Phase II will consist of extensive testing of preferred propellant formulations and determination of their suitability for various applications.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Eltron Research & Development, Inc.	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James White

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.6 Gels